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Invited Talk

Measurements of the Equations of State of Materials in the Multi-Mbar Regime using Laser-Driven Shocks*

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Since high intensity lasers produce material conditions appropriate for ICF, they offer the opportunity to explore the equations of state (EOS) of materials under ICF and similar high energy density conditions. There have been few laser-driven EOS experiments in spite of the fact that the EOS is crucial for hydrodynamic descriptions of laser experiments. Often the conditions of the shocked samples are unknown due to preheat. Obtaining data of sufficient accuracy has been difficult because of shock features, e.g., the lack of a uniform planar shock. are performing EOS measurements on the principal Hugoniot of liquid deuterium near 1 Mbar, and of polystyrene from 10-40 Mbar. Other materials are also being examined. We employ radiography to simultaneously measure two parameters of the shocked sample. In addition, by examining the emissivity of deuterium shocked to near 1 Mbar at several wavelengths, we are attempting to measure the color temperature of the shocked D_2. Key to this effort is the development and implementation of interferometric methods in order to carefully characterize the shock and the level of preheat in the samples.
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